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COLOR TONES IN STUCCO

*The Atlas Portland Cement Company
New York*

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PLATE I.

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"The beauty of the stucco house was heightened by judicious planting . . . and by training vines here and there on the wall."

(Frontispiece.)

COLOR TONES IN STUCCO

"As soon as color began to be used in broad and opposed fields, it was perceived that the mass of it destroyed its brilliancy and it was tempered by chequering it with some other color or colors in smaller quantities, mingled with minute portions of pure white."—RUSKIN.

RESEARCH and experiments in surface treatment, texture and color tones of stucco are being carried on by The Atlas Portland Cement Company, with a view to developing to the fullest extent the æsthetic possibilities of this material.

Among the earlier examples of stucco encountered in our research work, some appealed to us as of especial interest to architects. These were described and illustrated in a brochure entitled "Early Stucco Houses," published in 1916 and already widely distributed to architects throughout the country.*

The present pamphlet illustrates a few of the results of the first series of experiments in toning stucco by the use of colored aggregates. They are by no means final, especially as regards texture, but they are presented to architects as the forerunner of further experimentation for such help as they may be in meeting a growing demand that promises to be of great artistic significance.

A history of the use of color in stucco would be out of place in this book, but an outline of the tendencies in more modern work will be of interest.

In the development of stucco which followed the advent of Portland Cement, the practical advantages gained by this new hydraulic material loomed so large that the question of appearance was almost lost sight of. The lime stucco of the past—perishable except in warmer climates—gave place to a new stucco as hard as stone, and lasting even in more severe climates.

As the new material came into more widespread use and became better understood, there was a gradual improvement in appearance; and, with the employment of lattice and vines to break up the monotony of the gray surface, interesting possibilities presented themselves.

Later, a cement-lime stucco containing white marble dust produced a glistening white surface, more attractive than the gray but without the strength and durability of straight cement stucco.

Early in the present century came the intro-

duction of white Portland Cement. Used with white marble dust, white cement stucco had the same interesting effect and brilliant surface as the cement-lime stucco, with the added qualities of greater strength and durability. The beauty of the white stucco house was heightened by the judicious planting of low thick shrubs and by training vines here and there on the walls. This had the effect of tying the house to the ground and making it harmonize with the surrounding landscape.

White stucco, when it is new, is almost a dead white, but with time it tones or mellows gracefully. To force this toning and mellowing process, instead of waiting for nature to take its course, cement coatings and dry color pigments were resorted to.

The flat-tone cement coatings applied to the finished stucco robbed it of its texture to a considerable extent and gave a uniformity of tone that was too monotonous. Besides, the coatings required more or less frequent renewals.

Dry color pigments were more permanent, did not spoil the texture, and were somewhat less monotonous. Small quantities were needed, because the tone desired was usually not far off the white and because the mineral colors were highly concentrated. This latter characteristic made precise measurement, accurate mixing, and care in applying essential. Otherwise, there were likely to be distinct lines of demarcation where one batch of mortar joined another.

What was desired, however, was life and character in the wall, and this led us to the use of the exposed colored aggregate, with its unlimited possibilities in variety of color, warmth of tone, and interesting texture. This color is permanent.

At first only light-colored aggregates were chosen, for all that the white stucco seemed to require was something warm in tone and not far off the white. So we decided to experiment with yellows, buffs, pinks, warm grays and light greens.

The second essential was the selection of aggregates, each having in itself a naturally varie-



PLATE II. One part Atlas-White Cement, one part white sand and two parts gravel of a naturally variegated color. Integral method.

gated color, such as the gravel in Plate I, which runs from warm whites and yellows to browns and blacks. The pink granite used in Plate IX, besides its predominating pink, contains light green, opal, yellow, brown and some black.

Uniformity of color was to be avoided, but not every one of the aggregates available at this time gave variety. Plates I and VI illustrate the result of combining two such aggregates and indicate that, with somewhat different proportions, some interesting effects might be produced. An almost endless variety seems possible by this method of combining two or more aggregates in different proportions.

Of course, the limestones and sandstones do not afford striking contrasts of color. So no experiments were tried with them. Possibly, however, the salmon-colored Kettle River sandstone of Minnesota might be used, livened with other aggregates.

Another thing which developed was the effect produced by the white background on the colored aggregate: the greater the proportion of light background, the lighter the general tone, so that darker aggregates could be used than at first seemed possible when we decided to confine our experiments to light colors.

In calculating the quantity of aggregate that would be necessary to color the finish coat of stucco on a small house (say 20 x 40 feet, and 20 feet high), we found that it would take only two cubic yards. This surprisingly small quantity means that it is unnecessary to limit the selection of aggregates to those immediately at hand, if more distant quarries better answer the purpose. This aggregate may be purchased cheaply, for it is quarry waste, and forwarded at little cost.

In the experiments, each variety or combination of aggregates was made up in both white and gray cement. Only the white cement panels are reproduced, because with the gray cement the color value of the aggregates was lost.

No color pigments or other artificial colors were used in the panels illustrated, or in any of the experiments. The color aggregates in themselves seem to be sufficient to accomplish almost any desired color tones. The irregular spots of color natural to some aggregates give a beautiful rich quality to the general tone. Indeed the æsthetic value in the more successful panels illustrated may be said to lie in the fact that they follow nature and use nature's own materials and simple harmonies of tone and color.

Two methods of introducing the aggregates were used. In one, the integral method, the aggregate was mixed in with the cement and sand. In the other, the aggregate was thrown on and impressed with the float.

In the integral method the stucco, after it had set but before it had hardened (about two hours after applying), was scrubbed with an ordinary household scrubbing brush to expose the aggregate by removing the thin film of cement which covers the particles when they are incorporated in the wet mortar. Clear water was used in scrubbing. But when the surface film got too hard and dry, before the main mass of stucco had set sufficiently to be scrubbed, it was necessary to use a solution of commercial muriatic acid (one part acid to five parts water). Immediately following this acid scrubbing, the stucco was sprayed with water to remove all traces of the acid which, if left, would be likely to stain or injure the stucco. This acid washing costs only a fraction of a cent a square foot and does not require skilled labor.

In actual practice, colored aggregate stucco is quite "fool proof." The aggregates constitute the greater bulk of the mortar, so any normal inaccuracy in measurement will not make a marked contrast—on the contrary the slight variation is bound to be agreeable.

Texture is a point we have not yet touched upon. The tendency in the last decade has been, and we believe properly so, to use a coarse texture. The coarser aggregate is almost bound to produce a coarse texture. The only attempt at texture study in our experiments is illustrated by the comparison of Plates VII and VIII, in which sand aggregate was used. These two plates, it may be of interest to note, represent the extreme of color that we have secured so far by using colored sand. The thin film of cement obscures the color of the sand. The acid-washing process would, no doubt, bring out the color of the sand more prominently.

To summarize the results of our first series of experiments: Colored aggregate stucco affords almost unlimited possibilities in warmth and variety of tone and interesting character and texture. As a building material, it has in high degree the three prime requisites: BEAUTY, which improves with age; FITNESS for any form of architectural design and every sort of environment; and DURABILITY under every condition of climate and construction.



PLATE III. One part Atlas-White Cement, two parts white sand and one-tenth part hydrated lime. Yellow gravel grit thrown on and pressed in.

LOCATION OF AGGREGATES

Just what is available in the way of colored aggregates, in various parts of the country, has not yet been fully ascertained*; but it would seem that the following offer possibilities. Every architect can add to it from his own knowledge of local deposits. In the same way,

the architect, with his knowledge of the setting of the house he is to build, the color scheme he desires, and working with his own choice of aggregates and formulæ, will naturally produce colored stucco results surpassing our initial efforts.

GRANITE

Color	Name	Producer	State
Pink	Pink Granite	Seerie Bros.	Denver, Colo.
"	"	Wise Granite Co.	Wise, N. C.
"	"	Rockport Granite Co.	Rockport, Mass.
"	"	Hunkins-Willis Lime and Cement Co.	St. Louis, Mo.
"	"	Wisconsin Granite Co.	Waupaca, Wis.
Pink and Black	Milford Pink	Bay State Pink Granite Co.	Milford, Mass.
"	"	Webb Pink Granite Co.	Worcester, Mass.
"	Stony Creek	Norcross Bros.	"
"	Red Westerly	New England Granite Works	Westerly, R. I.
Pink and Green	Pompton Pink	Pompton Pink Granite Co.	Pompton Lakes, N. J.
Red	Wisconsin Ruby	Anderson Bros. & Johnson Co.	Wausau, Wis.
"	Red Granite	Bodwell Granite Co.	Rockland, Me.
"	"	Wisconsin Granite Co.	Chicago, Ill.
Yellow	Dark Mohegan	Oklahoma State Reformatory	Granite, Okla.
Green	Windsor Green	Mohegan Granite Co.	New York City
"	Green Granite	Windsor Green Granite Co.	Windsor, Vt.
Green and Black	Sea Green	Wisconsin Granite Co.	Chicago, Ill.
Dark Green and Greenish Gray	Dark Gray	Maine & N. H. Granite Corp.	New York City
		Rockport Granite Co.	Rockport, Mass.

MARBLE

Yellow	Jaune Sattilo	C. M. Gray Marble Co.	Long Island City, N. Y.
"	Yellow Marble	Robert Rossman Co.	Chicago, Ill.
Pink	Roseal	Appalachian Marble Co.	Knoxville, Tenn.
"	Jardin de Fleur	Middlebury Marble Co.	Middlebury, Vt.
Green	Georgia Pink	Georgia Marble Co.	Tate, Ga.
"	Sylvan Green	H. A. Schweyer Co.	Easton, Pa.
"	Westfield Green	Westfield Marble and Sandstone Co.	Westfield, Mass.
"	Green Marble	Robert Rossman Co.	Chicago, Ill.
"	Verde Antique	Vermont Marble Co.	Proctor, Vt.
Red	Serpentine	F. C. Carey	Los Angeles, Cal.
"	Red Marble	Robert Rossman Co.	Chicago, Ill.
"	Oriental	Vermont Marble Co.	Proctor, Vt.
Onyx	Jasper	"	"
White	Onyx	New Pedra Mexican Onyx Co.	San Diego, Cal.
Various Colors can be secured from these firms	White Marble	Conlin & Co.	Tuckahoe, N. Y.
}		Pisani Bros.	Astoria, N. Y.
}		C. D. Jackson & Co.	New York City
}		Juventy & Cornelis.	"
}		John H. Shipway & Bro.	"
}		Tompkins-Kiel Marble Co.	"
}		Voska-Bremer Marble Co.	Kansas City, Mo.

SANDSTONE

Buff	Briar Hill	Arlando Marine	New York City
"	Kingwood Stone	Kingwood Quarries Co.	Kingwood, W. Va.
" to Light Pink	Kettle River	Kettle River Co.	Kettle River, Minn.
Red	Potsdam Red	Potsdam Red Sandstone Co.	Potsdam, N. Y.

GRAVEL, Etc.

Yellow	Yellow Gravel	Phœnix Sand and Gravel Co.	New York City
"	Grit	"	"
"	Sand	"	"
"	Gravel	Goodwin-Gallagher Sand and Gravel Corp.	"
"	Grit	"	"
"	Sand	"	"
"	Metuchen Sand	Raritan Ridge Clay Co.	Metuchen, N. J.
Black and White	Utica Spar	Crown Point Spar Co.	New York City

*A complete list of colored aggregates, with data, is being compiled. Further information will be furnished on request.



PLATE IV. One part Atlas-White Cement, one part white sand and two parts yellow marble screenings. Integral method.



PLATE V. One part Atlas-White Cement, one part white sand and two parts red marble screenings. Integral method.



PLATE VI. One part Atlas-White Cement, one part white sand and two parts marble screenings, consisting of a mixture of the aggregates in Plates IV. and V. Integral method.

SPECIFICATIONS FOR STUCCO IN COLOR

The purpose of the following forms is to furnish the architect with a convenient guide for the preparation of stucco specifications. They have been drafted with especial reference to the use of colored aggregates.

Three separate columns are provided for the different types of construction, one for stucco on masonry walls, one for stucco on sheathed frame walls and the third for stucco on skeleton frame walls. Materials and methods peculiar to one form of construction occur only in its particular column. Requirements common to all forms carry across all three columns. Variable parts are in italics.

For convenience of reference, all notes have been placed immediately following the specification paragraph of which they are explanatory.

STUCCO WORK

	BRICK AND HOLLOW TILE WALLS	SHEATHED FRAME WALLS	SKELETON FRAME WALLS
Scope.	1. The work required under this <i>section</i> of the specification comprises the stuccoing of all exterior wall and chimney surfaces, as shown on the drawings and hereinafter described. NOTE.—When a separate specification is written for the stucco work, the words in italics will be omitted.		
General Conditions.	2. Attention is called to the General Conditions, in the fore part of this specification, which apply equally to all trades. NOTE.—When a separate specification is written for the stucco work, the general conditions governing the work will be placed here instead of the reference in paragraph 2.		
Protection.	3. All materials shall be properly protected while stored at the site and shall not be placed on the ground. Fresh stucco shall be protected against the weather. No stucco in which cracks, pits, streaks, discolorations, or other defects may occur will be accepted.		
Cement.	4. Cement shall be Atlas Portland Cement for undercoats and Atlas White Portland Cement for finish coat.		
Aggregate.	5. Aggregate for undercoats shall be thoroly clean sand, graded from fine to coarse grains, with the coarse predominating, and shall be free from loam, salt, vegetable and other deleterious matter. NOTE.—The binding qualities of the cement are adversely affected unless sand is as above described; and if the sand is not naturally clean, it should be washed after its removal from the bank. By grading sand from fine to coarse, a more dense and more waterproof mortar is obtained.		
Lime.	6. Aggregate for finish coat shall be thoroly clean <i>yellow gravel grit</i> . NOTE.—Alternatives for the material in italics are: yellow and red marble screenings, gravel grit of variegated colors, pink and green granite screenings, etc.		
Water-proofing Compound.	7. Lime shall be (state brand) hydrated lime. NOTE.—The admixture of a small quantity of hydrated lime in stucco mortar does not materially decrease its strength and it does, to a marked degree, increase its plasticity, making it work more freely under the trowel. As lime is an inert void filler, it renders the stucco substantially moisture-proof. 8. Waterproofing compound shall be (state brand, etc.). NOTE.—Under extensive experiments, hydrated lime has proven so generally successful as a waterproofer of stucco, that we advocate its use in place of the so-called waterproofing compounds. In the coat or coats in which any of these compounds are used, the hydrated lime should be omitted.		



PLATE VII. One part Atlas-White Cement and three parts brownish yellow sand. Surface floated. The same mixture of cement and sand thrown on dry after floating.

	BRICK AND HOLLOW TILE WALLS	SHEATHED FRAME WALLS	SKELETON FRAME WALLS
Color Pigments.	9. Coloring matter shall be (state brand) dry color pigments. NOTE.—When color is to be produced other than by the use of colored aggregate, mineral colors only should be employed. They should be of the highest degree of purity, of substantially the same specific gravity as the cement, and unaffected by lime, cement or the action of the elements.		
Hair.		10a. Hair shall be first quality long cattle or goat hair.	10b. Hair shall be first quality long cattle or goat hair.
Water.	11. Water shall be clean and free from acids or strong alkalies.		
Furring.		12a. Galvanized half-inch crimped furring not lighter than 22-gauge, shall be fastened over the sheathing paper and directly along the line of the studs, using $1\frac{1}{4}$ inch 14-gauge galvanized staples, placed 12 inches apart.	12b. Galvanized half-inch crimped furring not lighter than 22-gauge, shall be fastened directly to the studing, using $1\frac{1}{4}$ inch, 14-gauge galvanized staples, placed 12 inches apart.
Lath.		13a. (Expanded Metal) Lath shall be (give maker's name) expanded metal of 24-gauge, weighing not less than 4 pounds per sq. yd., galvanized after expansion. 14a. (Wire Cloth) Lath shall be (give maker's name) 19-gauge wire, woven $2\frac{1}{2}$ meshes to the inch, galvanized after being woven.	13b. (Expanded Metal) Lath shall be (give maker's name) expanded metal of 24-gauge, weighing not less than 4 pounds per sq. yd., galvanized after expansion. 14b. (Wire Cloth) Lath shall be (give maker's name) 19-gauge wire, woven $2\frac{1}{2}$ meshes to the inch, galvanized after being woven.
		NOTE.—Paragraphs 13a and 14a are alternatives. An improved form of construction, taking the place of the furring (paragraph 12a) and the lath (paragraph 13a or 14a) is an expanded metal lath combining furring in the form of an integral stiffening rib, or a wire cloth with a V-stiffening.	NOTE.—Paragraphs 13b and 14b are alternatives. An improved form of construction, taking the place of the furring (paragraph 12b) and the lath (paragraph 13b or 14b) is an expanded metal lath, combining furring in the form of an integral stiffening rib, or a wire cloth with a V-stiffening.
		15a. Place lath horizontally over the furring, driving $1\frac{1}{4}$ inch 14-gauge galvanized staples 8 inches apart over the furring. The sheets of lath shall be locked or lapped at least 1-inch and tied at joints between studs, both vertically and horizontally, with 18-gauge wire. The lath shall be folded around the corners at least 3 inches.	15b. Place lath horizontally over the furring, driving $1\frac{1}{4}$ inch 14-gauge galvanized staples 8 inches apart over the furring. The sheets of lath shall be locked or lapped at least 1-inch and tied at joints between studs, both vertically and horizontally, with 18-gauge wire. The lath shall be folded around the corners at least 3 inches.



PLATE VIII. One part Atlas-White Cement and three parts brownish yellow sand. Troweled so as to produce a variegated texture with inequalities of surface.

	BRICK AND HOLLOW TILE WALLS	SHEATHED FRAME WALLS	SKELETON FRAME WALLS
Mortar.	<p>16. Mortar for first and second coats shall be composed of one (1) part of Portland Cement, three (3) parts of sand and one-tenth (1-10) part of hydrated lime by volume.</p> <p>17a. Hair may be added to the first coat mortar but in quantity only sufficient to bond the mortar.</p> <p>NOTE.—Hair is added to the first coat of mortar on metal lath to hold the mortar together on the lath, otherwise there would be considerable waste due to the mortar dropping behind the lath, but no greater quantity than is necessary to accomplish this purpose should be used, as an excessive amount of hair will prevent the mortar from going thru the lath sufficiently to thoroly embed the metal and so preserve it from corrosion.</p>	<p>17b. Hair may be added to the first coat mortar but in quantity only sufficient to bond the mortar.</p> <p>NOTE.—Hair is added to the first coat of mortar on metal lath to hold the mortar together on the lath, otherwise there would be considerable waste due to the mortar dropping behind the lath, but no greater quantity than is necessary to accomplish this purpose should be used, as an excessive amount of hair will prevent the mortar from going thru the lath sufficiently to thoroly embed the metal and so preserve it from corrosion.</p>	
	<p>18. Mortar for finishing coat shall be composed of one (1) part of White Portland Cement, two and one-half (2½) parts of aggregate and one-tenth (1-10) part of hydrated lime by volume.</p> <p>NOTE.—If a waterproofing compound is to be used, the reference to lime in paragraph 18 should be stricken out and a description of the waterproofing compound inserted.</p>	<p>19. The finishing coat shall be brought to a tone selected by the addition of dry color in quantity not exceeding 10 per cent. of the weight of the cement.</p> <p>NOTE.—An excess of color weakens the mortar. Stucco made with White Portland Cement responds more quickly to color tones.</p>	
	<p>20. Proportions stated are by volume and one bag (94 pounds) of cement is to be considered as one cubic foot.</p>		
Mixing.	<p>21. Mixing shall be done on a water-tight platform, the different constituents thoroly mixed dry to a uniform color, water then added to obtain the proper consistency and the whole turned over until the mass is uniform in color and consistency.</p> <p>22. There shall not be mixed at one time more mortar than will be used within thirty (30) minutes. No retempered mortar shall be used under any circumstances.</p> <p>NOTE.—Cement is likely to take its initial set within 30 minutes after mixing, and in even less time during the hot summer months. The practice of retempering mortar after it has taken its initial set, cannot be too strongly condemned.</p>		
	<p>23. The dry color in the finishing coat shall be very carefully weighed or measured and thoroly mixed with the sand. The cement and lime shall then be added and the entire mass thoroly mixed by shoveling, from one side of the platform to the other, thru a $\frac{1}{4}$-inch mesh screen; when the batch is of uniform color the water shall be added.</p> <p>NOTE.—The water, as well as the other constituents, should be carefully measured so that each batch will be of the same consistency.</p>		
Mortar Application.	<p>24. The stucco shall be applied in three coats, each coat not less than $\frac{1}{4}$-inch or more than $\frac{3}{8}$-inch in thickness, the whole finishing</p>	<p>24a. The stucco shall be applied in three coats, each coat not less than $\frac{1}{4}$-inch or more than $\frac{3}{8}$-inch in thickness, the whole finishing</p>	<p>24b. The stucco shall be applied in three coats and back-plastered one coat, the whole finishing $1\frac{1}{2}$ inches thick, with the outside face</p>



PLATE IX. One part Atlas-White Cement and three parts white sand. Pink Granite screenings cast on and lightly floated.

	BRICK AND HOLLOW TILE WALLS	SHEATHED FRAME WALLS	SKELETON FRAME WALLS
Mortar Application. <i>Continued</i>	<p>$\frac{7}{8}$-inch thick beyond the normal masonry line. The plastering shall be carried on continuously in one general direction, without allowing the mortar to dry at the edge. Where this is impossible, the joints shall be made at a break, an opening or other natural division of the surface. Stucco shall not be applied when the temperature is below freezing. Masonry surfaces shall be cleaned and thoroly saturated with water just before the first coat of mortar is applied. See note following 28.</p> <p>25. The first coat shall be applied under pressure to secure a good bond.</p>	<p>1-inch thick over the furring strips. The plastering shall be carried on continuously in one general direction, without allowing the mortar to dry at the edge. Where this is impossible, the joints shall be made at a break, an opening or other natural division of the surface. Stucco shall not be applied when the temperature is below freezing.</p>	<p>1-inch beyond face of studs. The finishing coat shall be not less than $\frac{1}{4}$-inch in thickness. The plastering shall be carried on continuously in one general direction, without allowing the mortar to dry at the edge. Where this is impossible, the joints shall be made at a break, an opening or other natural division of the surface. Stucco shall not be applied when the temperature is below freezing.</p>
		<p>25a. The first coat shall be applied under pressure so that the mortar will be forced thru the lath and completely embed the metal on both sides. This cannot be done if excessive quantity of hair is used. Special care shall be taken to fill all voids around furring strips and where lath laps.</p>	<p>25b. The first coat shall be applied under pressure to secure a good key, and after it has set shall be back-plastered on the inside or back surface of the lath to a thickness of $\frac{1}{2}$-inch.</p>
		<p>26. After the first coat has set but before it has dried, the second coat shall be applied and floated <i>to a true plane with wood screeds placed at 5-foot intervals and about openings.</i></p> <p>NOTE.—Where a surface having inequalities is desired, the words in italics should be omitted.</p> <p>27. After the second coat has set but before it has dried, the finishing coat shall be applied and finished as hereinafter specified.</p> <p>28. The undercoats shall be cross-scratched before the initial set has taken place and shall be thoroly wetted before the succeeding coats are applied. The finishing coat shall be kept moist for at least two days, either by gently spraying with water after the mortar has hardened sufficiently to permit it or by hanging wet burlap or other fabric over the surface.</p> <p>NOTE.—To fully develop its binding properties, cement requires moisture continuously during the period of crystallization. For this reason masonry surfaces and undercoats are saturated so that they will not absorb the water from succeeding coats and the finish coat is kept moist by either gently spraying the stucco itself or by soaking burlap curtains hung about 6 inches away from the stucco. The latter provision is particularly necessary during the hot summer months in order to prevent the evaporation of the water in the finished surface, which is the cause of crazing or hair cracks.</p> <p>29. (Exposed Aggregate). The finishing coat, within twenty-four (24) hours after it has been troweled to an even surface, shall be scrubbed with a stiff brush until the</p>	



PLATE X. One part Atlas-White Cement, one part white sand and two parts of gravel grit. Integral method.

	BRICK AND HOLLOW TILE WALLS	SHEATHED FRAME WALLS	SKELETON FRAME WALLS
Surface Finish. <i>Continued</i>			
	aggregate has been uniformly exposed. Should the cement be too hard to be readily removed by water, a solution of one (1) part muriatic acid to four (4) parts of water may be used, but as soon as the aggregate has been exposed particular care shall be taken to remove all trace of the acid by spraying with clean water from a hose.		
	30. (Smooth Troweled). Finishing coat shall be smoothed with a metal trowel, with as little rubbing as possible.		
	31. (Stippled). Finishing coat shall be smoothed with a metal trowel, with as little rubbing as possible, and then shall be lightly patted with a brush of broom straw to give an even stippled surface.		
	32. (Sand Fleeted). Finishing coat, after being brought to a smooth even surface, shall be rubbed in a circular motion with a wood float. This floating shall be done when mortar has partially set and a little sand shall be used to slightly roughen the surface.		
	33. (Sand Sprayed). After the finishing coat has been brought to an even surface, it shall be coated with a creamy mixture of equal parts of <i>white</i> cement and <i>white</i> sand, mixed fresh in a bucket every thirty (30) minutes and kept well stirred. This mixture shall be forcibly thrown from a whisk broom against the finishing coat while it is still moist and before it has attained its final set.		
	34. (Rough Cast). After the finishing coat has been brought to an even surface and before attaining its final set, it shall be uniformly coated with a mixture of one (1) part <i>white</i> cement to two (2) parts <i>white</i> sand, thrown forcibly against the wall in such a manner as will produce a rough surface of uniform texture.		
	35. (Pebble Dash). After the finishing coat has been brought to an even surface and before attaining its initial set, clean pebbles shall be forcibly thrown against the mortar and embedded therein. Pebbles shall vary in size from $\frac{1}{4}$ -inch to $\frac{1}{2}$ -inch, shall be well wetted before being cast and shall be uniformly distributed over the surface. They may be pressed into the mortar with a clean wooden paddle but the surface shall not otherwise be disturbed.		
	Note.—The above surface finishes are alternative. Under no circumstances should the stucco be worked after it has attained its initial set.		
Samples.	36. Samples of the surface finish shall be laid up well in advance of the work and the approved sample shall be carefully preserved during the prosecution of the work and used as a standard.		
Framing.	<p>NOTES FOR OTHER SECTIONS OF SPECIFICATIONS</p> <p>The success of stucco on wood frame construction is as dependent upon the character of the framework as it is of the stucco itself. A well braced and rigid framework is absolutely essential. The following provisions are presented as a standard of good practice in this regard.</p> <p>The studs should be spaced 12 inches on centers and be continuous from main sill to rafter plate, with 1x6-inch ribbons housed into studs to support the floor joists and tie the studs together. No girts or other horizontal grained members should intervene. The floor joists should be securely spiked to the studs.</p>		

	BRICK AND HOLLOW TILE WALLS	SHEATHED FRAME WALLS	SKELETON FRAME WALLS
Bridging.		No bridging is required.	Once in the height of each story, the stud walls should have a row of 2x3-inch bridging cut in diagonally between the studs and securely spiked to them.
Sheathing.		Matched or ship-lap sheathing, dressed one side to a thickness of $\frac{7}{8}$ -inch, not less than 6 or more than 8 inches wide, should be laid diagonally over the studs and fastened with two nails at every bearing.	No sheathing is required.
Water-proofing.		Sheathing boards should be covered with a felt, thoroly waterproofed by impregnation with tar or asphalt—not a sheathing paper—well lapped and tacked at joints and well flashed and tacked about openings.	The outer face of studs and the sides for a distance of 2 inches back from the face, should be thoroly coated with a pitch or asphalt compound, to interpose waterproofing between the stucco and the framework.
Insulation.		When greater insulation, than the waterproof felt affords, is desired, such as quilting or corrugated paper, this insulation should be placed between the waterproof paper and the sheathing.	After the stucco lath has been back-plastered, the air space between the studs may be divided by applying between the bridging and the inside plastering, quilting or other insulating material, fastening it in place by nailing wood strips over the fold in the paper, on the sides of the studs.
Furring.		Unless metal furring is used, or a lath of which metal furring forms an integral part, the wall should be furred over the waterproof paper with 1x2-inch strips placed vertically 12 inches on centers and about openings.	Unless metal furring is used, or a lath of which metal furring forms an integral part, the wall should be furred with 1x2-inch strips placed vertically on the studs and about openings.
Sills.		Sills of openings should have ample slope and projection and undercut drips.	Sills of openings should have ample slope and projection and undercut drips.



